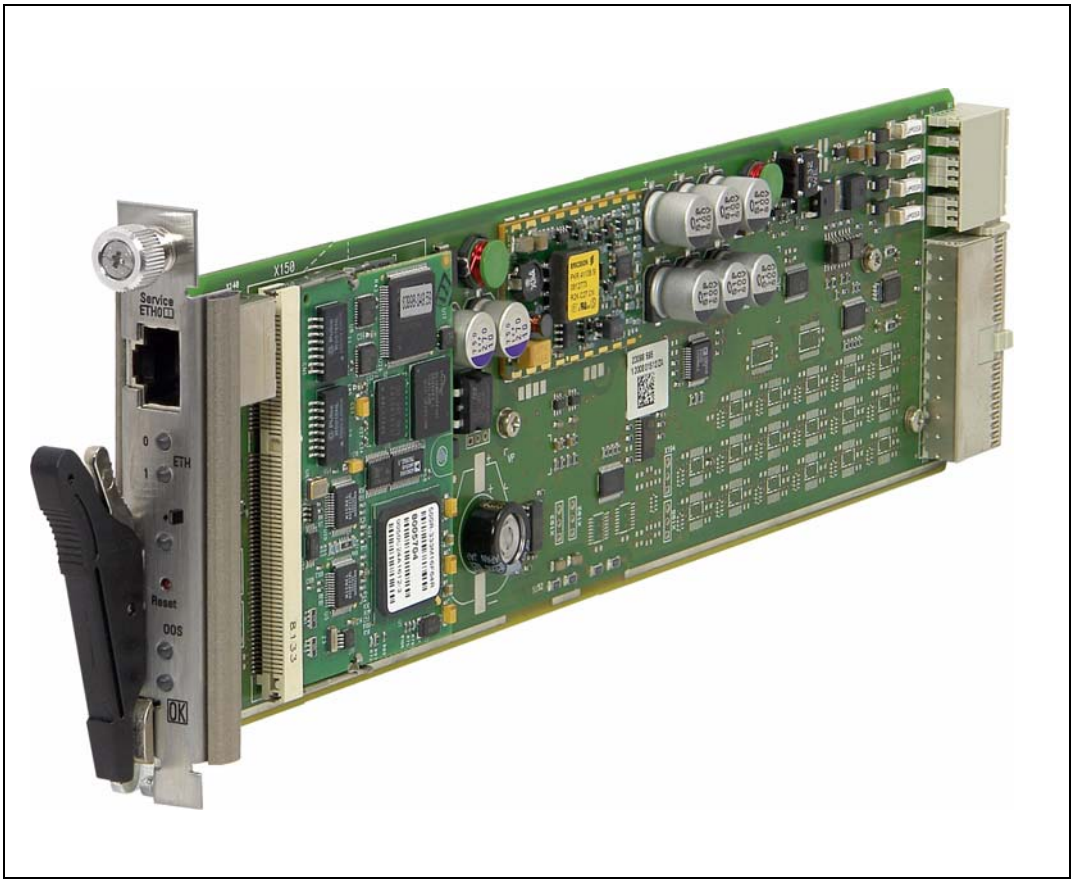
# Shelf Manager ShMM-ACB-V

## User's Manual




**Product Number:**

**21596-291**

**21596-292**

Doc-No: 63972-243

Revision: R1.0, September 24, 2008

Pentair
Technical Products

| Rev. | Date updated | Change |
|---|---|---|
| R1.0 | September 24, 2008 | Initial Release |
| | | |

Impressum:

Schroff GmbH

D-75334 Straubenhardt, Germany

The details in this manual have been carefully compiled and checked - supported by certified Quality Management System to EN ISO 9001/2000

The company cannot accept any liability for errors or misprints. The company reserves the right to amendments of technical specifications due to further development and improvement of products.

Copyright © 2008

All rights and technical modifications reserved.

# Table of Contents

**1 Safety ..... 1**
1.1 Safety Symbols used in this document ..... 1
1.2 General Safety Precautions ..... 1
1.3 References and Architecture Specifications ..... 2
1.4 Terms and Acronyms ..... 2
**2 Product Definition ..... 3**
2.1 ACB-V Product Overview ..... 5
2.2 Front Panel Components ..... 6
**3 Shelf Manager Installation ..... 7**
**4 ACB-V Block Diagram ..... 8**
**5 IPMB ..... 9**
5.1 Bused IPMB Interface (Product Number: 21596-291) ..... 9
5.2 Radial IPMB Interface (Product Number: 21596-292) ..... 9
**6 RS-232 Interfaces ..... 10**
6.1 Serial Console Cables ..... 11
**7 Ethernet Interface ..... 11**
**8 Shelf Manager and Shelf Alarm Panel ..... 12**
**9 Master-Only I²C Bus ..... 13**
**10 Power Supply ..... 15**
10.0.1 DC-DC Converter ..... 15
10.0.2 Input Fuses ..... 16
10.0.3 Voltage and Fuse Monitoring ..... 16
**11 Fan Control ..... 17**
11.1 Schroff Fan Trays ..... 18
11.1.1 Control characteristics (examples) ..... 18
11.1.2 Block Diagram Fan Tray - Shelf Manager ..... 19
**12 Hardware Address ..... 20**
**13 RESET ..... 21**
13.1 Reset Input / Output ..... 21
**14 Redundancy Control ..... 22**
14.0.1 Hardware Redundancy Interface ..... 22
**15 Hot Swap Interface ..... 23**
15.1 Hot Swap Switch ..... 23
15.2 Board Presence ..... 23
15.3 Hot Swap LED ..... 23

**16 Telco Alarms ..... 24**
**17 Shelf Manager Connectors ..... 25**
**18 Technical Data ..... 29**

# 1 Safety

**The intended audience of this User's Manual is system integrators and hardware/software engineers. This manual describes the hardware features of the Schroff ACB-V Shelf Manager. The software features are detailed in the ShMM-500 documentation from Pigeon Point Systems and the Schroff firmware release notes.**

## 1.1 Safety Symbols used in this document

| | |
|---|---|
| | **Hazardous voltage!**<br>*This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.* |

| | |
|---|---|
| | **Caution!**<br>*This is the user caution symbol. It indicates a condition where damage of the equipment or injury of the service personnel could occur. To reduce the risk of damage or injury, follow all steps or procedures as instructed.* |

| | |
|---|---|
| | **Danger of electrostatic discharge!**<br>*The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.* |

## 1.2 General Safety Precautions

| | |
|---|---|
| | **Warning!**<br>*Voltages over 60 VDC can be present in ATCA Shelves. As defined in the PICMG 3.0 Specification, this equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.* |

- Service personnel must know the necessary electrical safety, wiring and connection practices for installing this equipment in a telecommunication environment.
- Install this equipment only in compliance with local and national electrical codes.
- For additional information about this equipment, see the PICMG 3.0 Specification (*www.picmg.com*).

## 1.3 References and Architecture Specifications

- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference (*www.pigeonpoint.com*)
- Pigeon Point Systems Shelf Manager User Guide (*www.pigeonpoint.com*)
- PICMG® 3.0 AdvancedTCA® Base Specification (*www.picmg.com*)
- PICMG® Engineering Change Notice ECN 3.0-2.0-00
- Analog Devices ADM1024 Reconfigurable Remote Temperature Sensor and Supply Voltage Monitor
- Analog Devices ADM1026 Highly Integrated Thermal and System Monitor
- Philips Semiconductors PCA9545 4-Channel I2C with interrupt logic and reset
- Philips Semiconductors PCA9555 16-bit I2C and SMBus I/O port with interrupt
- National Semiconductor LM75 Digital Temperature Sensor and Thermal Watchdog with Two-Wire Interface

## 1.4 Terms and Acronyms

**Table 1: Terms and Acronyms**

| Term | Definition |
|---|---|
| ATCA | Advanced Telecom Computing Architecture |
| Backplane | Passive circuit board providing the connectors for the front boards. Power distribution, management and auxiliary signal connections are supported |
| CDM | Chassis Data Module |
| Chassis | Enclosure containing subrack, Backplane, boards, cooling devices, PEMs, same as Shelf |
| CMM | Chassis Management Module, same as Shelf Manager |
| ECN | Engineering Change Notice |
| ESD | Electrostatic Discharge |
| ETSI | European Telecommunications Standards Institute |
| FRU | Field Replaceable Unit |
| IPMB | Intelligent Platform Management Bus |
| IPMC | Intelligent Platform Management Controller |
| IPMI | Intelligent Platform Management Interface |
| PCB | Printed Circuit Board |
| PEM | Power Entry Module |
| RTC | Real Time Clock |
| RTM | Rear Transition Module |
| Shelf | See Chassis |
| VRTN | Voltage Return |

# 2 Product Definition

The Schroff Shelf Manager ACB-V is a 78 mm x 280 mm board that fits into a dedicated Shelf Manager slot in a Schroff ATCA Shelf.

The Shelf Manager has two main responsibilities:

1 Manage/track the FRU population and common infrastructure of a Shelf, especially the power, cooling and interconnect resources and their usage.

2 Enable the overall System Manager to join in that management/tracking through the System Manager Interface, which is typically implemented over Ethernet.

The Shelf management based on the Pigeon Point Shelf management solution for AdvancedTCA products.
The Shelf management software executes on the Pigeon Point **Sh**elf **M**anagement **M**ezzanine **500** (**ShMM-500**), a compact SO-DIMM form-factor module, installed on the ACB-V carrier board.
The ACB-V carrier board includes several on-board devices that enable different aspects of Shelf management based on the ShMM-500. These facilities include I²C-based hardware monitoring/control and GPIO expander devices.

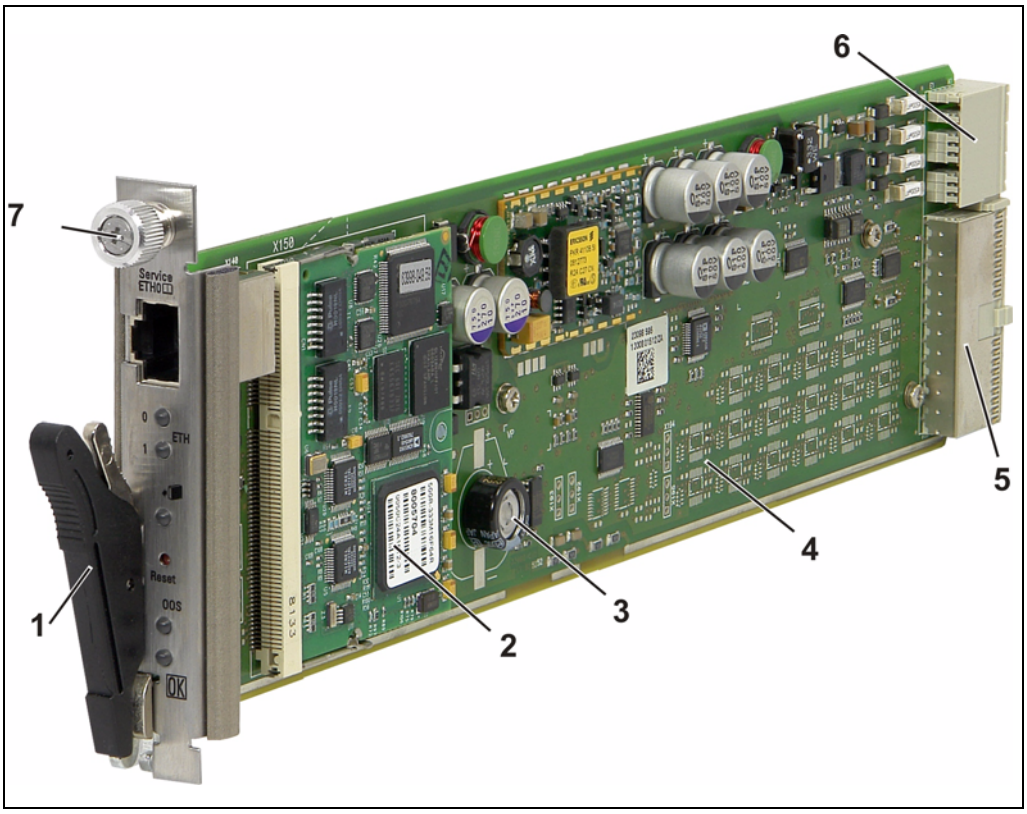
The ACB-V also provides the Fan Controller for up to 9 Fans and individual Ethernet connections to both Base Hubs (ShMC cross connect), according to PICMG Engineering Change Notice ECN 3.0-2.0-001

The Shelf Manager communicate inside the Shelf with IPM controllers over the Intelligent Platform Management Bus (IPMB). The Shelf Manager also provides an IPMB interface for the non-intelligent FRUs in a Schroff Shelf. The Shelf Manager communicate with the non-intelligent FRUs over I²C busses and expose the sensors for these FRUs at IPMB address 0x20.

*Shelf Manager with bused IPMB: 21596-291 (Product Number)*
*21596-300 (Catalog Number with packaging)*

*Shelf Manager with radial IPMB: 21596-292 (Product Number)*
*21596.301 (Catalog Number with packaging)*

**Figure 1: Schroff Shelf Manager**




12708845

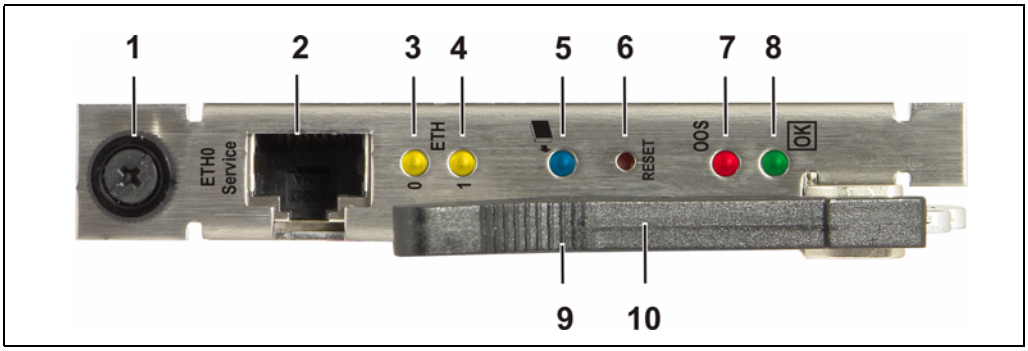
| | | | |
|---|---|---|---|
| 1 | Extraction handle | 5 | Backplane Connector (J2) |
| 2 | ShMM-500 | 6 | Backplane Connector (J1) |
| 3 | RTC Backup Capacitor | 7 | Fixing screw |
| 4 | ACB-V Carrier Board | | |

## 2.1 ACB-V Product Overview

- 78 mm x 280 mm board
- SODIMM 144-pin socket with ShMM-500 Shelf Management Mezzanine Card from Pigeon Point Systems
- Dual RS-232 serial ports
- Dual 10/100 Ethernet interfaces
- IPMB-A/B interfaces with bused or radial topology
- Reset push button
- Master-only $I^2C$ bus populated with hardware monitoring/control, GPIO and bus switch devices
- Power supply voltage monitoring
- On-board temperature monitoring
- Detection of hardware address with parity
- Injector/Ejector handle with Hot Swap switch
- Hot swap LED
- Capacitor for the ShMM-500 RTC and ADM1026 intrusion detection
- Hardware redundancy interface with dedicated communication paths between dual Shelf Managers for redundant operation
- Interrupt requests for the ShMM-500 generated by on-board and off-board devices
- Status indication for important interfaces, using on-board and off-board LEDs
- Fan Controller for up to 9 fans
- Redundant –48 VDC inputs with on-board power regulation

## 2.2 Front Panel Components

**Figure 2: Shelf Manager Front Panel Components**



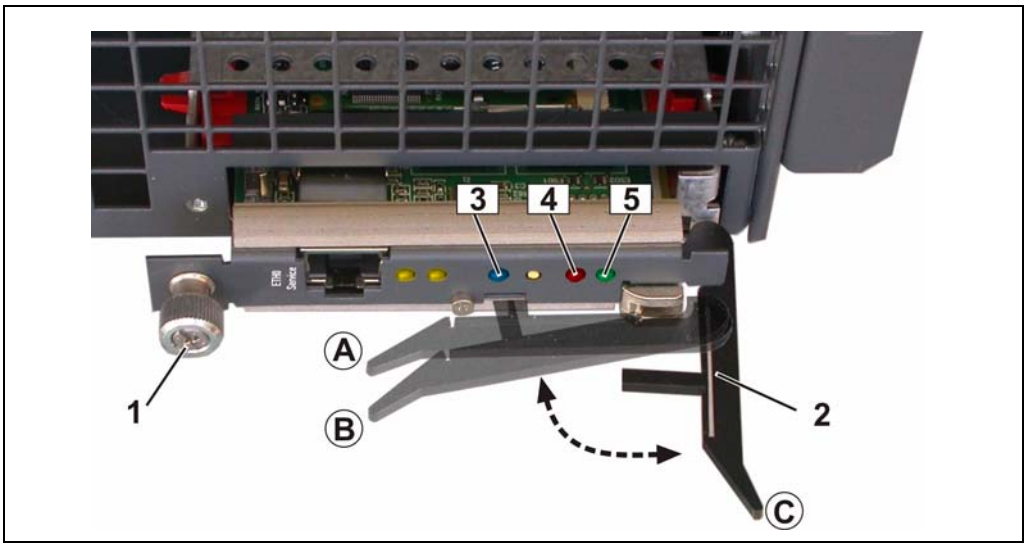

12708844

| | | | |
|---|---|---|---|
| 1 | Fixing screw | 6 | RESET push button |
| 2 | ETH 0 Ethernet Service Connector (RJ45) | 7 | Shelf Manager Status LED (red)<br>- Red = Out of Service (OOS) |
| 3 | ETH 0 Link/Activity LED (yellow)<br>- On = Link<br>- Off = No Link<br>- Blinking = Activity | 8 | Shelf Manager Status LED (green)<br>- Solid Green = in Service, active Shelf Manager<br>- Blinking = in Service, Backup Shelf Manager |
| 4 | ETH 1 Link/Activity LED (yellow)<br>- On = Link<br>- Off = No Link<br>- Blinking = Activity | 9 | Hot Swap Switch<br>- Activated by extraction handle |
| 5 | Hot Swap LED (blue)<br>- Solid Blue = ready to remove<br>- Blinking = Hot Swap is requested<br>- Off = No Hot Swap possible | 10 | Extraction handle |

# 3 Shelf Manager Installation

| | |
|---|---|
| | **Danger of electrostatic discharge!**<br>*Static electricity can harm delicate components inside the Shelf. You must wear an ESD wrist strap before exchanging any part or electric component!* |

**Figure 3: Shelf Manager**




12708847

*The Shelf the Shelf Manager can be installed in horizontal or vertical position, depending on the Shelf! (Figure shows horizontal position)*

**Install:**

1 Insert the Shelf Manager into the guides and push it completely into the Shelf. The lever (2) must be in position (C).

2 Close the lever (2) to position (A) and tighten the fixing screw (1).

3 The Shelf Manager is booting now. After aprox. one Minute the green Status LED (5) indicates that the Shelf Manager is functional.

*The Status LED of the active Shelf Manager is solid green, the Status LED of the backup Shelf Manager is blinking.*

**Remove:**

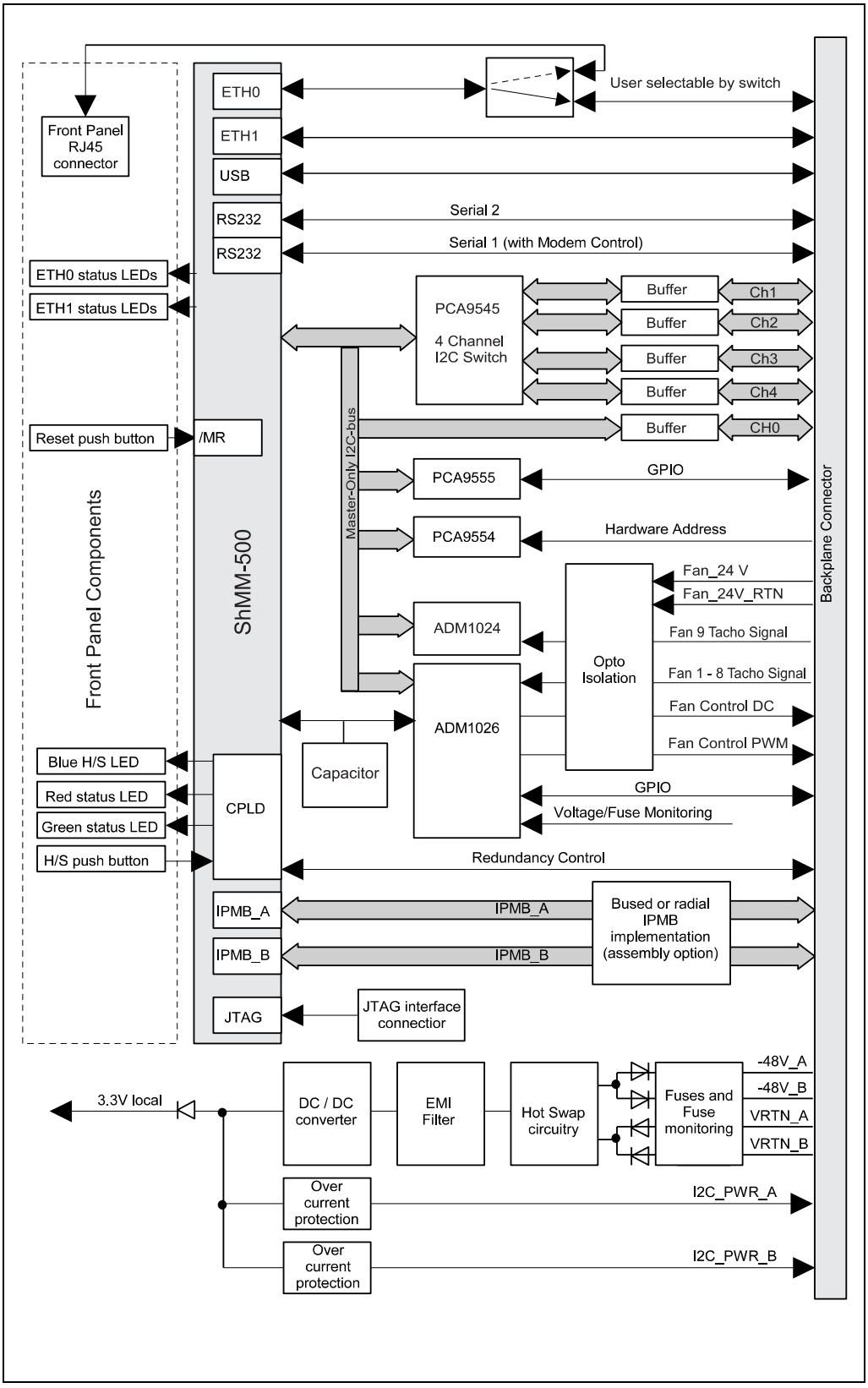
1 Unscrew the fixing screw (1).

2 Move the lever (2) to position (B) until the blue Hot Swap LED (3) starts blinking.

3 When the Hot Swap LED is solid blue, move the lever (2) to position (C) and pull out the Shelf Manager.

# 4 ACB-V Block Diagram

**Figure 4: ACB-V Block Diagram**




12708846

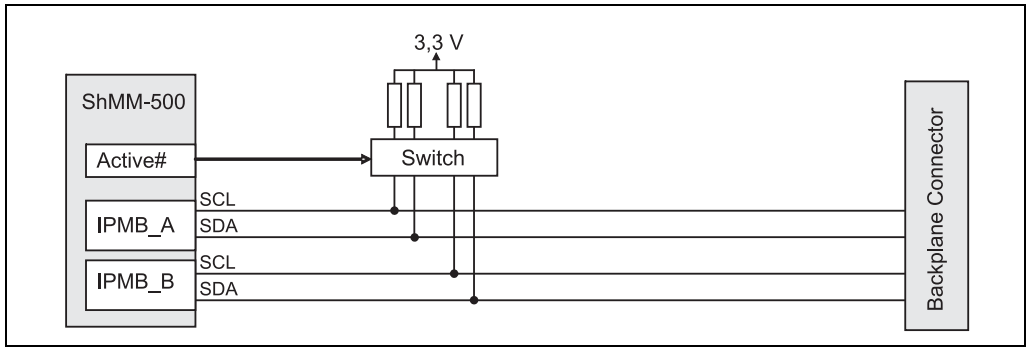
# 5 IPMB

## 5.1 Bused IPMB Interface (Product Number: 21596-291)

The ShMM-500 provides two IPMBs. The IPMB-A and IPMB-B from the ShMM-500 are routed directly to the Backplane connector. The ATCA Backplane buses the two IPMBs to the ATCA boards.

The Active# signal of the ShMM-500 is used to switch on/off the pull-up resistors of the IPMBs.

**Figure 5: Block diagram bused IPMB**

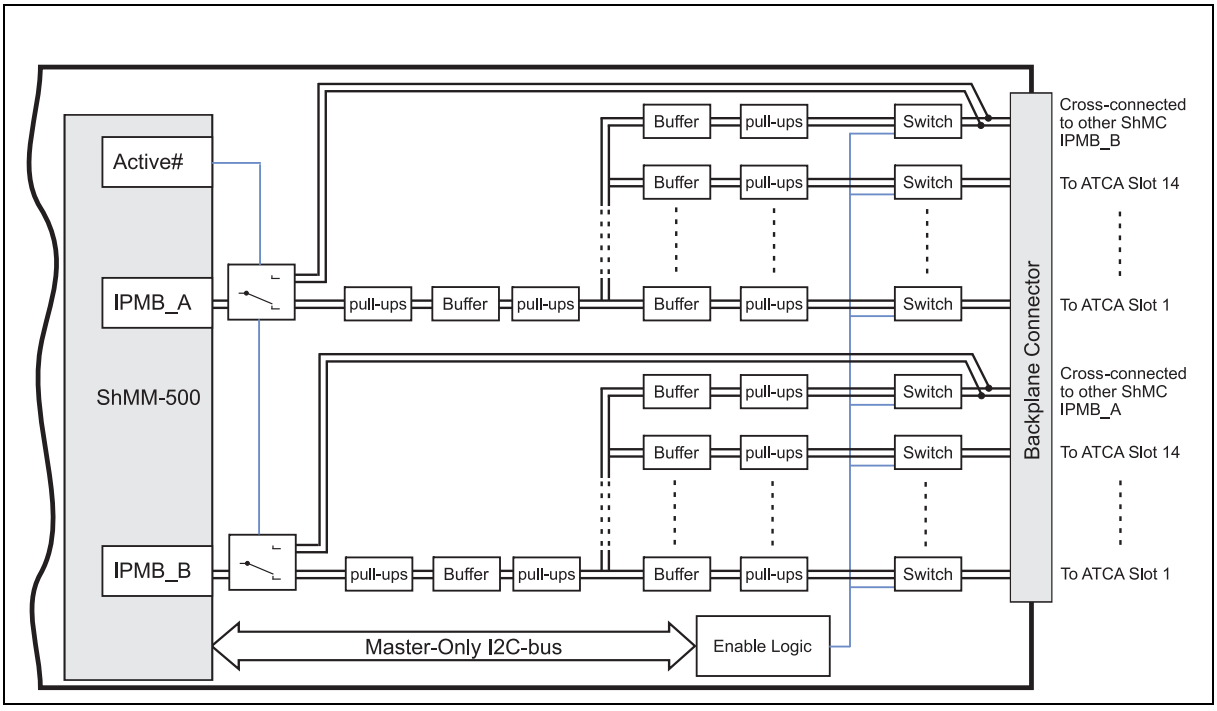



12708848

## 5.2 Radial IPMB Interface (Product Number: 21596-292)

The IPMB-A and IPMB-B buses from the ShMM-500 are routed through IPMB buffers and switches to the Backplane connector J2. The ATCA Backplane connects the individual IPMBs to the ATCA boards.

**Figure 6: Shelf Manager with radial IPMB**

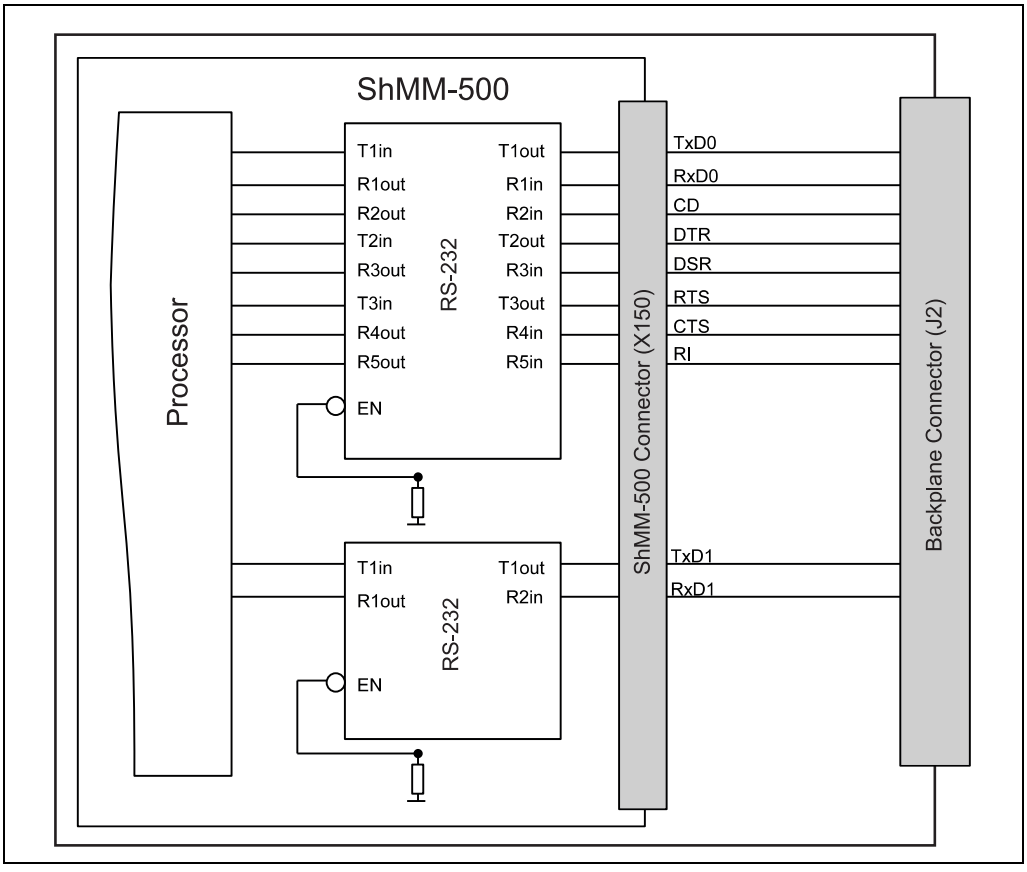



12708849

# 6 RS-232 Interfaces

The ACB-V provides two RS-232 interfaces. The first serial port is implemented using the built-in UART3 controller, the second serial port is implemented using the built-in UART0 controller of the processor on the ShMM-500.
The on-board RS-232 transceiver on the ShMM-500 is always enabled because the Ser_EN0 signal is pulled down on the ShMM-500.
The first serial interface provides a full set of RS-232 signals including modem control. In a Schroff Shelf these signals are routed through the backplane connector to the SAP. The SAP provides two 8-pin RJ45 modular receptacles for the serial interfaces of both Shelf Manager.
The second serial interface does not provide modem control signals. These signals are also routed to the backplane connector but not used in the Schroff ATCA Shelves.

**Figure 7: RS-232 Serial Ports**




12706891

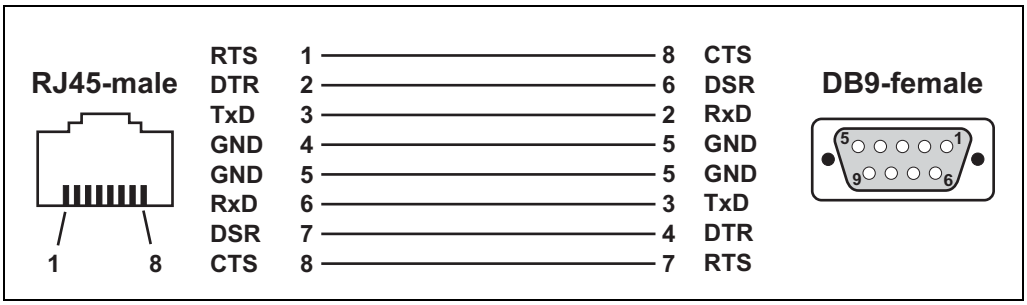
*The serial console default configuration is:*

- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

## 6.1 Serial Console Cables

To connect to the Shelf Manager via the serial console on the SAP you need a serial console cable.

**Figure 8: RJ45 to DB9 Serial Console Cable**




12706929

The connectors are shown with the cables pointing away.

*Depending on the model of the Shelf, the RJ45 connector may have a different pinout of the serial console signals. Refer to the Shelf manual for detailed information.*

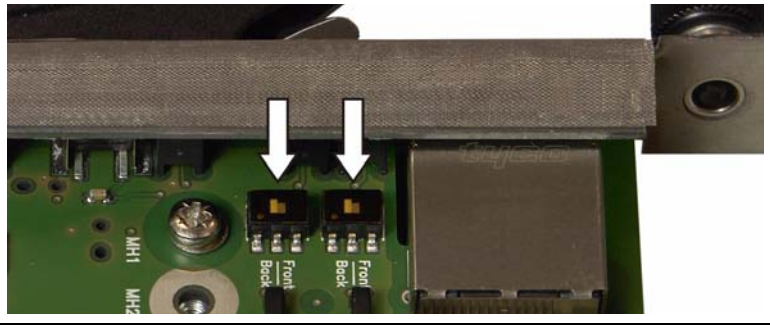
# 7 Ethernet Interface

The front panel ETH0 Ethernet connector is intended for service use only or for debugging purposes in laboratory environment. The computer which is connected to this interface must be located nearby the shelf manager with an Ethernet cable that is not longer than 10m. The front panel Ethernet connector MUST NOT be connected to a Telecommunication Network Circuit that leaves the building.

The ETH0 interface of the shelf manager can manually be switched between the front panel RJ45 connector (“Front”-position of the rocker-switch) and the backplane connector going to the hub board base interface (“Back”-position of the rocker-switch).

The ATCA specification requires a base channel interface between the shelf manager and the Hub board. The ETH0 rocker-switch MUST be in “Back”-position in normal operation of the shelf manager in an ATCA-shelf.

**Figure 9: Switches S101 and S102 shown in default position**




12708853

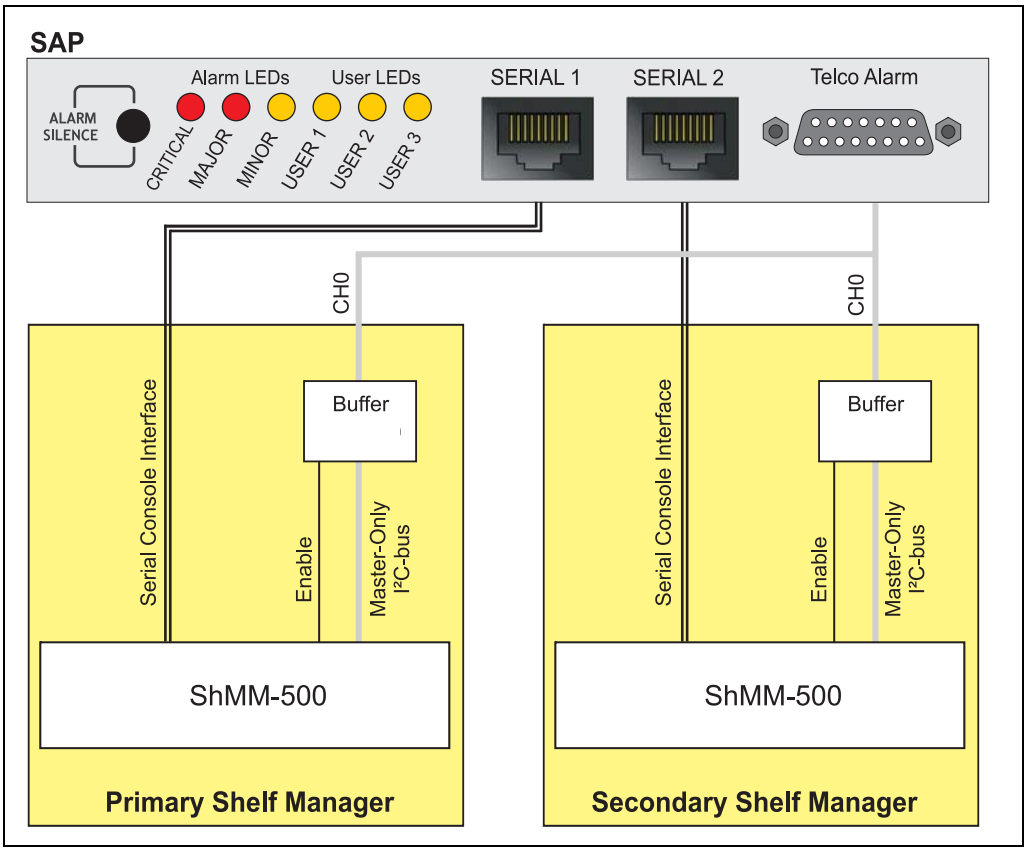
# 8 Shelf Manager and Shelf Alarm Panel

Some Shelf Manager I/O functionalities have been moved to a separate Board called Shelf Alarm Panel (SAP). The SAP provides the RJ45 Serial Console connectors, the Telco Alarm Interface, user definable LEDs and custom specific I/Os for the Shelf Manager. Only the active Shelf Manager has access to the SAP and can switch the Alarms. The advantage of this approach is that the SAP is separated from the Shelf Manager and can be located at a position at the Chassis that is easy to reach and operate by service personnel.

The figure below shows the interconnection between the Shelf Manager and the SAP. Please note that the design of the SAP is Shelf dependent, please see your Shelf User Manual for the actual SAP-implementation in your Shelf.

Please see *Chapter 16, "Telco Alarms"* for detailed information concerning the Telco Alarm interface and the user definable LEDs.

**Figure 10: Connection between Shelf Manager and SAP**




12706896

# 9 Master-Only I²C Bus

The master-only I²C bus is used on the ShMM-500 for the RTC and SEEPROM devices. The ACB-V carrier board also has a number of onboard I²C devices connected to the master-only I²C bus. These devices are:

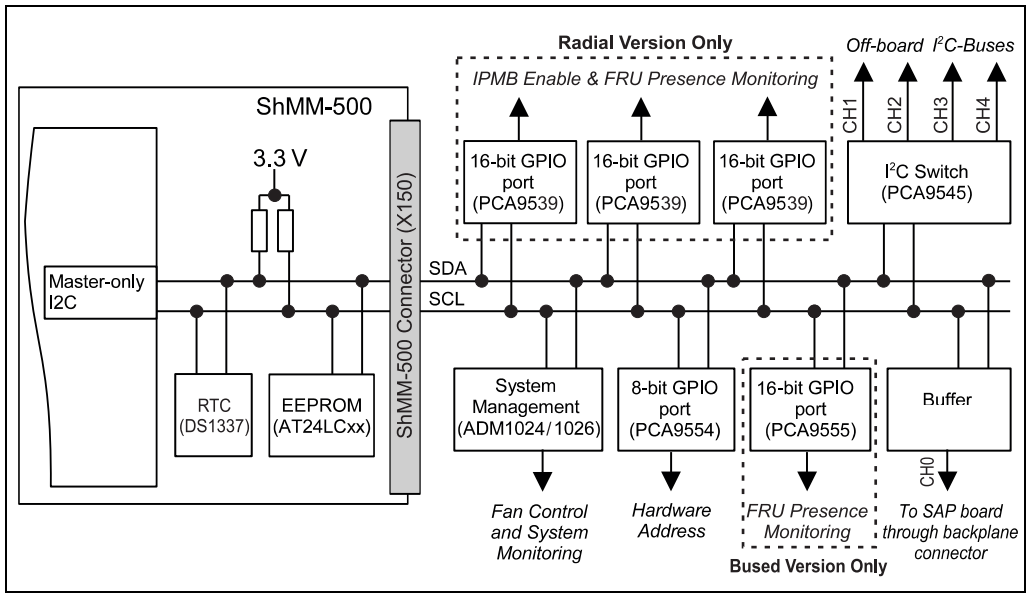
- PCA9554: reads the hardware address at the backplane connector
- PCA9555: monitor the presence signals from the PEMs, SAP, Airfilter and Fan Trays (only bused version)
- PCA9539: radial IPMB enable and monitoring of presence signals (only radial version)
- ADM1024/1026: monitor all Shelf Manager voltages, monitor/controls the Fan Trays, provides the board temperature
- PCA9545: This 4-channel switch divides the I²C-bus in 4 channels to:
  - the Shelf FRU SEEPROMs (Channel 1 and 2)
  - the Fan Trays and Shelf temperature sensors (Channel 3)
  - the PEMs (Channel 4)

Any individual SCx/SDx channel or combination of channels can be selected by changing the contents of the programmable control register of the PCA9545. Software running on the ShMM-500 is responsible for enabling/disabling individual I²C channels at each particular time, so that no address conflict results on the merged master-only I²C bus.

The master only I²C-bus is also buffered and then routed to the SAP providing Telco Alarm signalizing (Channel 0).

The 'Active' signal of the ShMM-500 is used to enable the I²C switch PCA9545 and the buffer, so that only the active Shelf Manager has access to the Shelf I²C-bus devices.

**Figure 11: Master-Only I2C-bus**




12706892

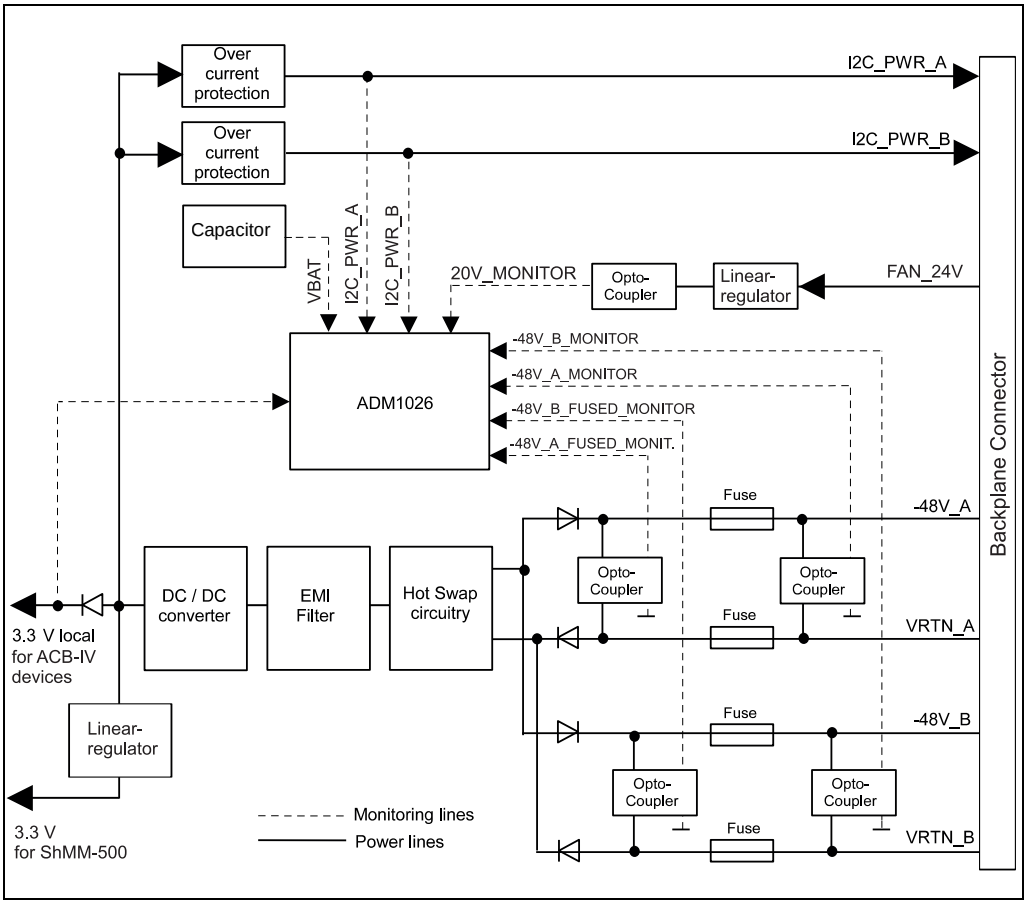
The following table lists the I²C slave devices. The ShMM-500 on-board RTC and SEEPROM and the Shelf devices are included for completeness.

**Table 2: I²C-bus addresses of the Shelf**

| I²C addr. | ShMM | ACB-IV | SAP (CH 0) | CH 1 | CH 2 | CH 3 | CH 4 |
|---|---|---|---|---|---|---|---|
| 0x44 / 22 | | | PCA9555 Telco Alarms | | | | |
| 0x46 / 23 | | PCA9554 HW-Addr | | | | | |
| 0x48 / 24 | | | | | | PCA9555 Fan Tray 0 (left) | PCA9555 PEM A |
| 0x4a / 25 | | | | | | PCA9555 Fan Tray 1 (center) | PCA9555 PEM B |
| 0x4c / 26 | | | | | | PCA9555 Fan Tray 2 (right) | |
| 0x4e / 27 | | PCA9555 GPIO (only bused version) | | | | | |
| 0x58 / 2C | | ADM1024 | | | | | |
| 0x5c / 2E | | ADM1026 | | | | | |
| 0x90 / 48 | | | | | | LM75 temp sensor | |
| 0x92 / 49 | | | | | | LM75 temp sensor | |
| 0x94 / 4a | | | | | | LM75 temp sensor | |
| 0x96 / 4b | | | LM75 SAP temperature | | | | |
| 0x98 / 4c | | | | | | LM75 temp sensor | LM75 PEM A |
| 0x9a / 4d | | | | | | LM75 temp sensor | LM75 PEM B |
| 0x9c / 4e | | | | | | LM75 temp sensor | |
| 0xa0 / 50 | SEEPROM | | | | | | |
| 0xa4 / 52 | | | | SEEPROM CDM 1 | SEEPROM CDM 2 | | |
| 0xa6 / 53 | | | SEEPROM SAP | | | | |
| 0xa8 / 54 | | | | | | SEEPROM Fan Tray 0 (left) | SEEPROM PEM A |
| 0xaa / 55 | | | | | | SEEPROM Fan Tray 1 (center) | SEEPROM PEM B |
| 0xac / 56 | | | | | | SEEPROM Fan Tray 2 (right) | |
| 0xe0 / 70 | | PCA9545 I²C-bus switch | | | | | |
| 0xe8 / 74 | | PCA9539 radial IPMB enable (only radial version) | | | | | |
| 0xea / 75 | | PCA9539 radial IPMB enable (only radial version) | | | | | |
| 0xee / 77 | | PCA9539 radial IPMB enable + GPIO (only radial version) | | | | | |
| 0xd0 / 68 | RTC DS1337 | | | | | | |

# 10 Power Supply

**Figure 12: Power Supply Block Diagram**




12708852

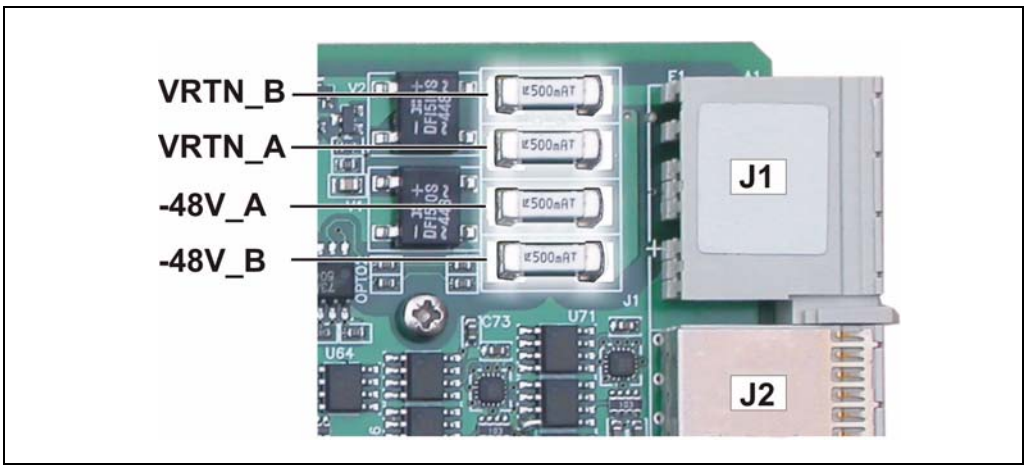
## 10.0.1 DC-DC Converter

The DC-DC converter on the ACB-V provides the power (3.3 V) for all on-board devices and all off-board I²C devices inside the Shelf.
The 3.6 V local power is routed through two current limiting circuits to create two redundant voltages, **I2C_PWR_A** and **I2C_PWR_B**.
I2C_PWR_A and I2C_PWR_B are routed to the backplane connector and used to power I²C-devices on FRUs like Fan Tray, PEM or SAP. If one of these voltages is short circuited on a chassis FRU or on the backplane, the short circuit current is limited to 700 - 900 mA so that the Shelf Manager and the FRUs are still fully operational.

## 10.0.2 Input Fuses

The –48 V input circuits are protected by fuses, one in the supply and in the return path.

**Figure 13: Input fuses**




12706897

*The fuses are not user-serviceable.*

## 10.0.3 Voltage and Fuse Monitoring

To detect a missing supply voltage as well as a blown fuse the ADM1026 provides voltage monitoring and control functions. The -48 VDC input voltage before and after the fuses are connected to the ADM1026 chip through optical-isolation devices, all other voltages are connected directly.

| Signal | Description | Device | Measurement |
|---|---|---|---|
| 3.3V local | 3.3 V supply for ACB-V on-board devices and for the ShMM-500 | ADM1026 , pin 22 | Analog |
| I2C_PWR_A | 3.6 V supply redundant path A going to Shelf I²C-devices | ADM1026 , pin 32 | Analog |
| I2C_PWR_B | 3.6 V supply redundant path B going to Shelf I²C-devices | ADM1026 , pin 30 | Analog |
| -48V_A_MONITOR | Indicates the presence of the –48 V_A / VRTN_A at the backplane connector (J1). | ADM1026 , pin 46 | Presence/Absence |
| -48V_A_FUSED_MONITOR | Indicates the presence of the –48 V_A / VRTN_A after the ACB-V's mains fuse. | ADM1026 , pin 44 | Presence/Absence |
| -48V_B_MONITOR | Indicates the presence of the –48 V_B / VRTN_B at the backplane connector (J1). | ADM1026 , pin 45 | Presence/Absence |
| -48V_B_FUSED_MONITOR | Indicates the presence of the –48 V_B / VRTN_B after the ACB-V's mains fuse. | ADM1026 , pin43 | Presence/Absence |
| VBAT | Backup-Battery voltage (Backup-Battery is assembly option) | ADM1026 , pin 29 | Analog |
| 20V_MONITOR | Indicate the presence of the 20 V auxiliary voltage supply generated on Fan Trays | ADM1026 , pin42 | Presence/Absence |

# 11 Fan Control

The Shelf Manager provides fan control functionality through the ADM1024/ 1026 system management controllers.

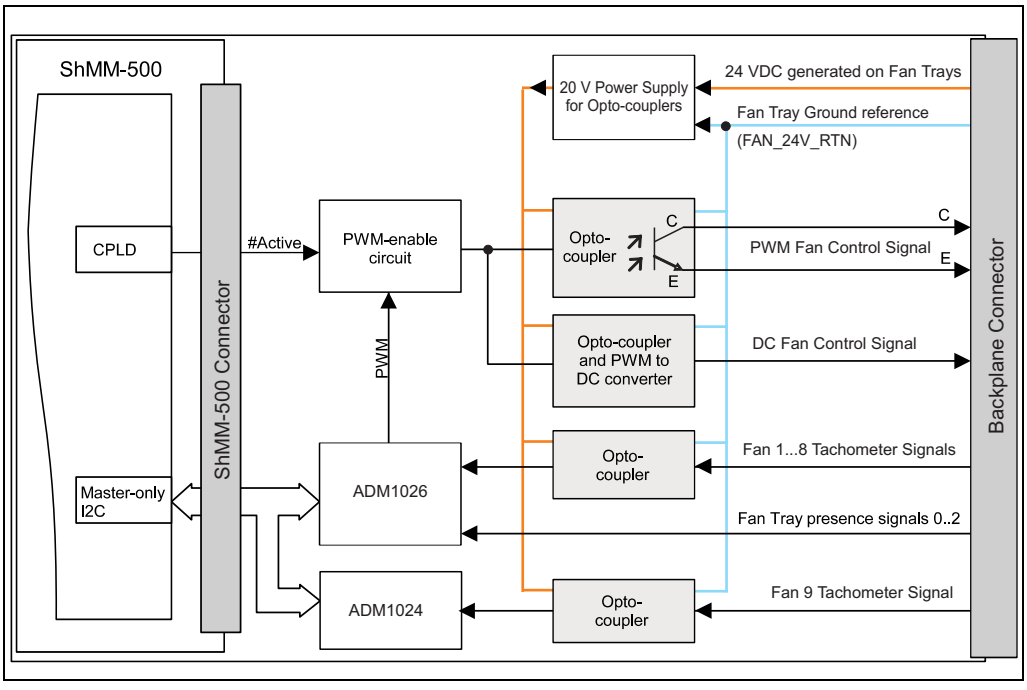
The fan speed is controlled by a 75 Hz PWM signal generated on the ADM1026. The PWM output from the ADM1026 is buffered and enabled by the ShMM-500's ACTIVE# signal so that only the active Shelf Manager controls the fan speed. The PWM signal is opto-isolated and routed to the backplane connector. For voltage-regulated Fans the Shelf Manager provides a converter that converts the PWM signal into a DC-voltage of 0 V to 10 V, referenced to the ground level of the Fan Tray electronics (FAN_24V_RTN), which is also available on the backplane connector.

The tachometer signals from the Fan Trays are routed through the backplane connector opto-isolated to the digital inputs of the ADM1026. Because the ADM1026 has only eight digital inputs with tachometer functionality, the signal of a ninth Fan is routed to the ADM1024.

Three digital inputs to the ADM1026 (FANP0..2/GPIO9..GPIO11) are used to detect the presence of Fan Trays. The Fan Tray grounds the signal to indicate that it is installed.

The Shelf Manager's fan tachometer inputs and fan control outputs (DC, PWM) are optically isolated from primary voltages of the fans. The primary side of the opto couplers is powered by a 24 V voltage (FAN_24V) which is generated on the Fan Trays and routed together with the Fan Tray ground reference (FAN _24V_RTN) to the Shelf Manager.

**Figure 14: Shelf Manager Fan Control Block Diagram**

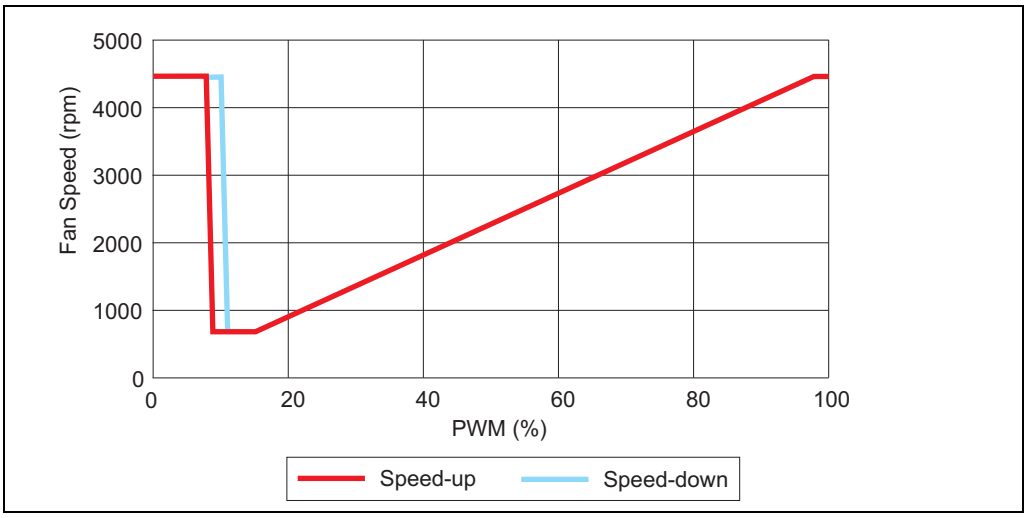



12706894

# 11.1 Schroff Fan Trays

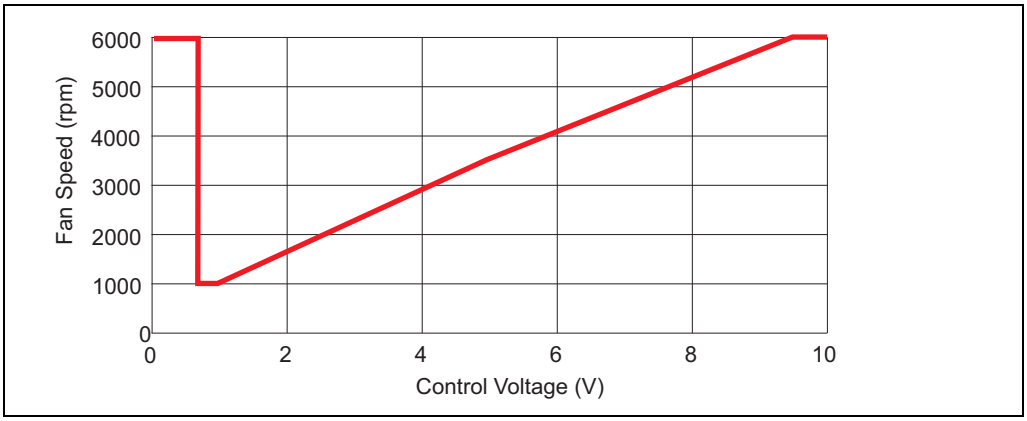
## 11.1.1 Control characteristics (examples)

**Figure 15: Fan Speed Control (PWM) for Shelves 11592-50x**



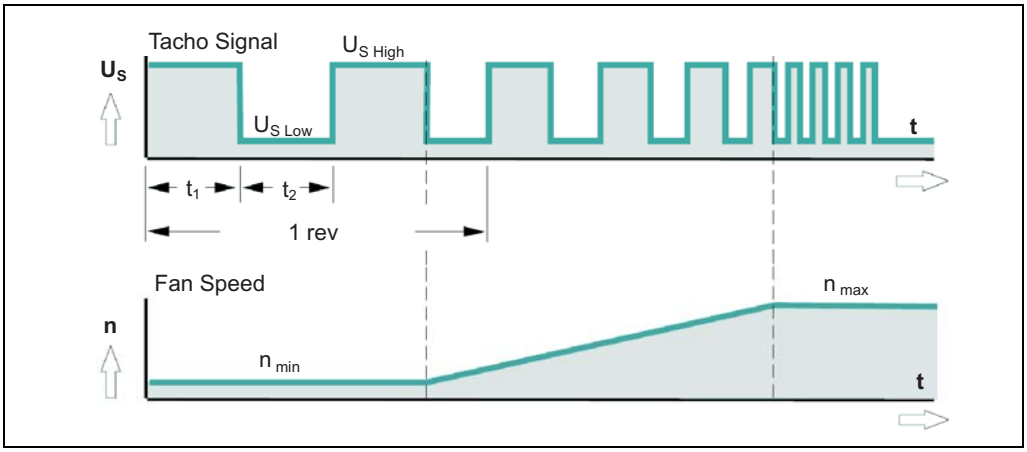

12706964

**Figure 16: Fan Speed Control (Control Voltage) for Shelves 11592-40x**




12706965

**Figure 17: Fan Tacho Signal Output**



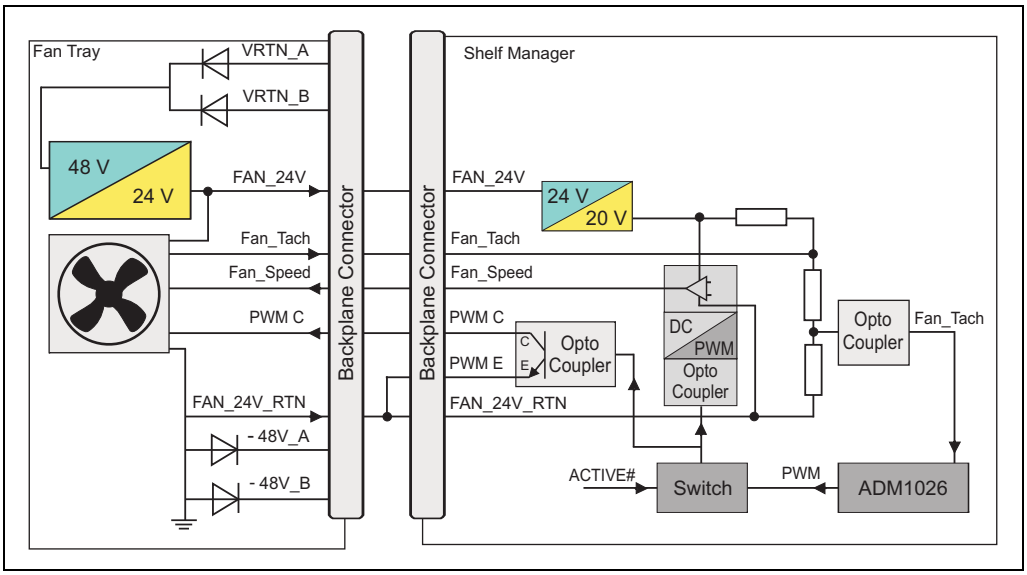

12706966

**Table 3: Fan Tacho Data**

| Description | Comment | Value |
|---|---|---|
| Tacho Type | /2 (open collector) | |
| Tacho operating voltage | | up to 30 V |
| Tacho level low | $I_{SINK}$ = 2 mA | < 0.4 V |
| Output Frequency | | (2 x n) / 60 Hz |

## 11.1.2 Block Diagram Fan Tray - Shelf Manager

**Figure 18: Block Diagram Fan Tray - Shelf Manager**

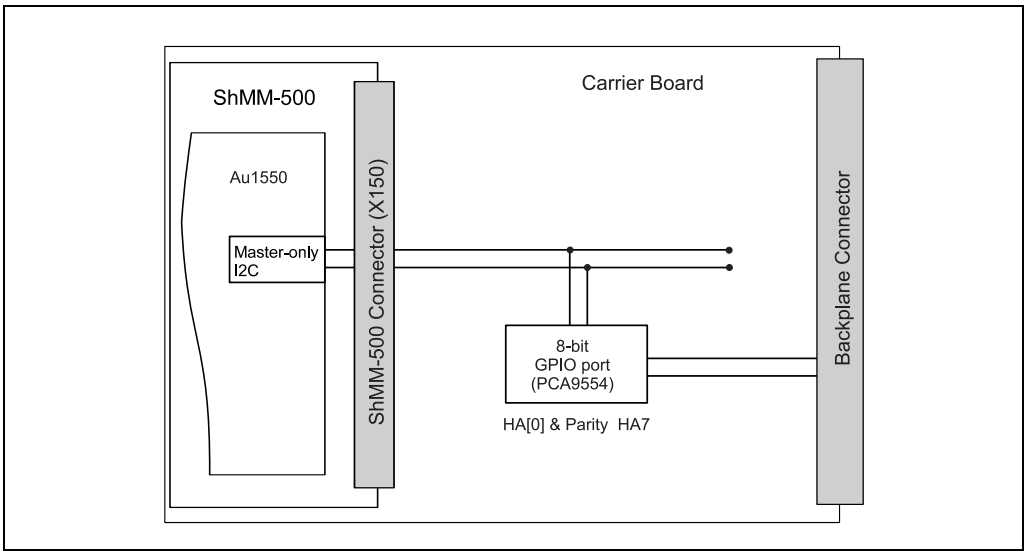



12706966

# 12 Hardware Address

The PCA9554 on the ACB-V reads the hardware address and parity bit from the backplane connector of the dedicated Shelf Manager slot.
Geographic address pins (HA[0], HA7) at the Backplane connector determine bit 0 and bit 7, bit 1 to bit 6 are hardware-coded on the Shelf Manager PCB. The ShMM-500 software determines the hardware address by reading the input port register of the PCA9554 at address 0x46.

**Figure 19:**




12706895

**Table 4: Allocation PCA 9554 GPIO Signal Pins to hardware address bits**

| Switch/Source | Signal | GPIO |
|---|---|---|
| J2 pin D3 | HA0 | 0x46-I/O0 |
| Tied to ground | HA1 | 0x46-I/O1 |
| Tied to ground | HA2 | 0x46-I/O2 |
| Tied to 3.3V | HA3 | 0x46-I/O3 |
| Tied to ground | HA4 | 0x46-I/O4 |
| Tied to ground | HA5 | 0x46-I/O5 |
| Tied to ground | HA6 | 0x46-I/O6 |
| J1 pin E10 | HA7/P | 0x46-I/O7 |

**Table 5: Shelf Manager Hardware and IPMB Addresses**

| | HW-Addr. | IPMB-Addr. | HA[0] | HA7 |
|---|---|---|---|---|
| Shelf Manager 1 | 0x08 | 0x10 | GND | GND |
| Shelf Manager 2 | 0x09 | 0x12 | n.c. | n.c. |

# 13 RESET

## 13.1 Reset Input / Output

The ACB-V provides a RESET push button on the front panel. It is connected to the ShMM-500's /MR signal.

The /MR signal is driven low by the CPLD on the ShMM-500 when the watchdog timer has expired. Additionally, the Shelf Manager may be reset by the user using the RESET Push Button.

The ShMM-500 activates the /Reset output signal on the following condition:

| Condition | Software/Hardware |
|---|---|
| Under software control | Software |
| Expiration of the watchdog timer | Hardware |
| Under-voltage condition or on-board LDO regulator failure | Hardware |
| Activation of the input /MR signal | Hardware |

The /Reset signal clears all logic on the ACB-V. The duration of the low pulse on the /Reset output is 200 ms.

# 14 Redundancy Control

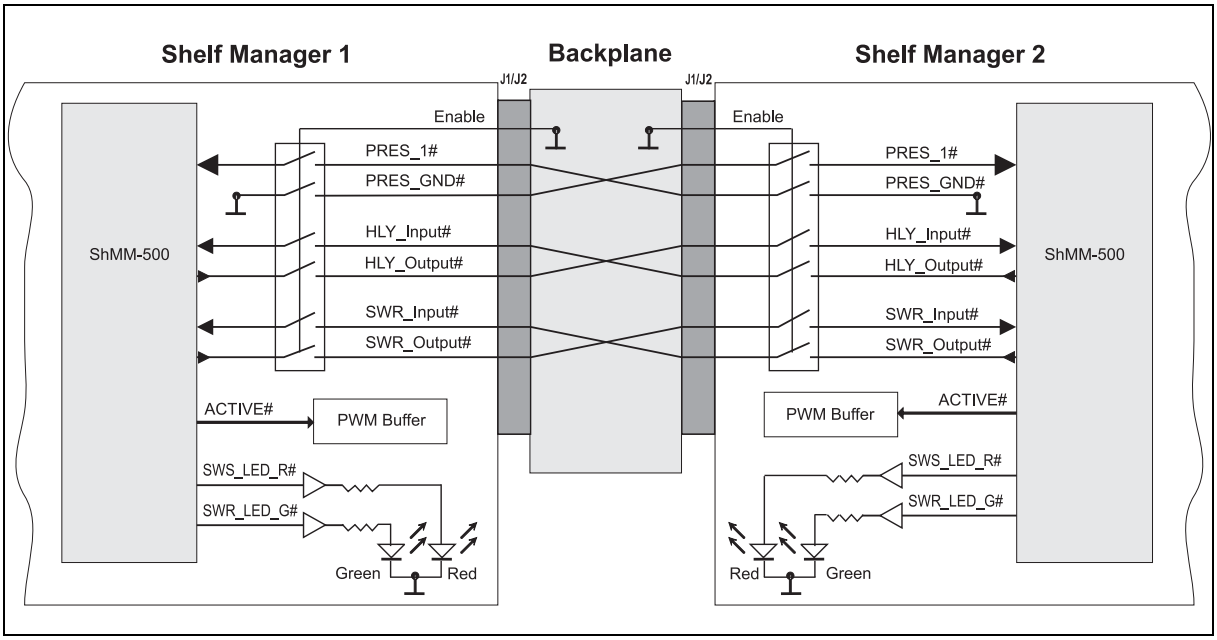
The Shelf Manager supports redundant operation with automatic switch-over using redundant Shelf Managers. In a configuration where two Shelf Manager are present, one acts as the active Shelf Manager and the other as a standby. The Shelf Managers monitor each other and either can trigger a switchover if necessary.

## 14.0.1 Hardware Redundancy Interface

The Shelf Manager provides a hardware redundancy interface with dedicated communication paths between dual Shelf Managers for redundant operation. The hardware redundancy interfaces of the Shelf Managers are as follows:

- Cross connected Shelf Manager present input (PRES_1#) and output (PRES_GND#)
- Cross connected Shelf Manager health input (HLY_Input#) and output (HLY_Output#)
- Cross connected negotiation input (SWR_Input#) and output (SWR_Output#)
- Active output from the ShMM-500 (ACTIVE#) that is used by the ACB-V to enable interfaces that must be exclusively driven by the active Shelf Manager, specifically PWM and fan tachometer buffers
- Two status LEDs using the SWS_LED_G# (Green) and SWS_LED_R# (Red) signals of the ShMM-500
- The PRES_1# signal is grounded on the redundant Shelf Manager. This indicates both Shelf Managers the presence of the other.

**Figure 20: Shelf Manager redundancy control**




12708859

# 15 Hot Swap Interface

The ACB-V provides a Hot Swap interface allowing the ACB-V to be replaced without powering down the Shelf. The Hot Swap interface is implemented using the on-ShMM-500 CPLD device. The interface is composed of three components:

- Hot Swap switch at injector/ejector handle
- Presence signal indicating that the ACB-V is fully seated in its backplane connector
- Hot Swap LED

## 15.1 Hot Swap Switch

The ACB-V provides a Hot Swap switch signal using a micro-switch to sense the injector/ejector handle position. The micro-switch provides an input (HS_LATCH) to the ShMM-500 CPLD, which is responsible for taking appropriate hardware actions as well as signaling the condition to the software.

| Micro-Switch | HS_LATCH Signal | HSL Bit in the CPLD | Condition |
|---|---|---|---|
| Open | High | 0 | Handle opened |
| Closed | Low | 1 | Handle closed |

## 15.2 Board Presence

Each Shelf Manager grounds the PRES_1# input signal of the other Shelf Manager when installed into the ATCA Backplane. This signal is responsible for taking appropriate hardware action as well as signaling the condition to the software.

## 15.3 Hot Swap LED

The Shelf Manager provides a a blue Hot Swap LED. The LED indicates when it is safe to "remove" the Shelf Manager from a powered Shelf.

**Table 6: Hot Swap LED**

| LED State | Condition |
|---|---|
| Off | The Shelf Manager is not ready to be removed/disconnected from the Shelf |
| Solid Blue | The Shelf Manager is ready to be removed/disconnected from the Shelf |
| Long-blink | The Shelf Manager is activating itself |
| Short-blink | Deactivation has been requested |

# 16 Telco Alarms

The Shelf Manager ACB-V can manage a Telco Alarm Interface with the following components:

- Telco Alarm connector
- Telco Alarm LEDs
- Telco Alarm Cutoff push button

In Schroff Shelves these components are located on a separate board called Shelf Alarm Panel (SAP). All three aspects of Telco interface are controlled by a PCA9555 located on the SAP. The PCA 9555 is connected to the Shelf Manager via an I²C connection at address 0x44. The Shelf management software running on the ShMM-500 is responsible for:

- configuring the PCA9555 as inputs or outputs, as appropriate for the Telco interface signal that a particular pin is attached to.
- reading and writing GPIO port registers at appropriate times.

The PCA9555 generates an active low interrupt output when one of the inputs changes its value. That interrupt output is routed on the ACB-V onto the shared interrupt line going to the INT# input of the ShMM-500. Software running on the ShMM-500 is responsible for reacting to an input change when an interrupt is triggered by the PCA9555.

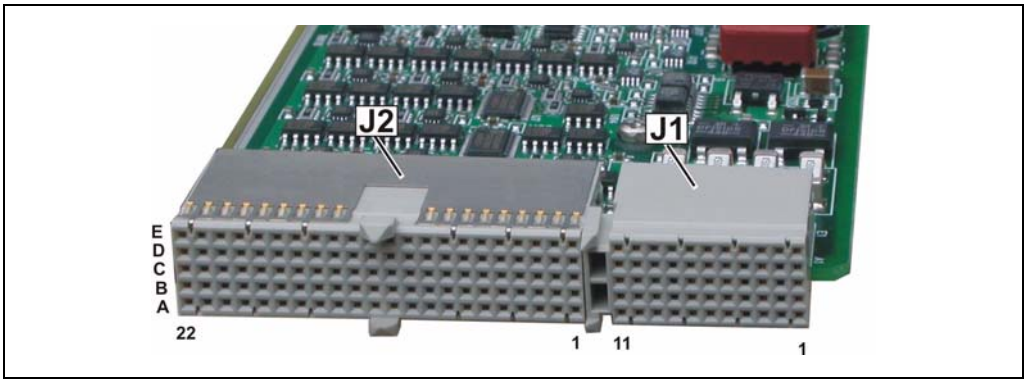
For more information see *Chapter 8, "Shelf Manager and Shelf Alarm Panel"* and the Chapter „SAP“ in the Shelf’s User Manual.

# 17 Shelf Manager Connectors

**Table 7: Front Panel 10/100 Ethernet Service Connector**

| Pin # | Ethernet Signal |
|---|---|
| 1 | TX+ |
| 2 | TX- |
| 3 | RX+ |
| 4, 5 | n.c. |
| 6 | RX- |
| 7, 8 | n.c. |

**Figure 21: Backplane Connectors**




12706898

**Table 8: Pin Staging (PS)**

| Pin# | length |
|---|---|
| **A** | **8.25 mm** |
| **B** | **9.75 mm** |
| **C** | **11.25 mm** |

*The Pin Staging (PS) is the length of the Pins of the connector at the Backplane not at the Shelf manager.*

**Table 9: Backplane Signal Connector (J1) pin assignment**

| | a | PS | b | PS | c | PS | d | PS | e | PS |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | -48 V_A | **B** | VRTN_A | **B** | NC | **B** | -48 V_B | **B** | VRTN_B | **B** |
| **2** | - | | - | | - | | - | | - | |
| **3** | SHELF_GND | **B** | SHELF_GND | **B** | SHELF_GND | **B** | SHELF_GND | **B** | SHELF_GND | **B** |
| **4** | - | | - | | - | | - | | - | |
| **5** | FAN_TACH0 | **A** | FAN_TACH1 | **A** | FAN_TACH2 | **A** | FAN_TACH3 | **A** | FAN_TACH4 | **A** |
| **6** | FAN_TACH5 | **A** | FAN_TACH6 | **A** | FAN_TACH7 | **A** | FAN_TACH8 | **A** | PWM_C | **A** |
| **7** | FAN_SPEED | **A** | NC | **A** | FAN_24V | **A** | FAN_24V_RTN | **A** | PWM_E | **A** |
| **8** | - | | - | | - | | - | | - | |
| **9** | PEM_PRES_A | **A** | SAP_PRES | **A** | SWR_Input# | **A** | HLY_Input# | **A** | SWR_Output# | **A** |
| **10** | TX+ | **A** | TX- | **A** | HS_EN | **A** | HLY_Output# | **A** | HA7 | **A** |
| **11** | AIR_FILT_PR | **A** | PEM_PRES_B | **A** | RX+ | **A** | RX- | **A** | PRES_1# | **A** |

**Table 10: Backplane Signal Connector (J2) pin assignment (Radial IPMB)**

| | a | PS | b | PS | c | PS | d | PS | e | PS | f | PS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FAN_PRES0 | A | TXD0 | A | TXD1 | A | FAN_PRES2 | A | INT# | A | GND | C |
| 2 | FAN_PRES1 | A | DTR | A | Pres_GND | A | CI | A | DSR | A | | C |
| 3 | CD | A | RTS | A | RXD1 | A | HA[0] | A | CTS | A | GND | C |
| 4 | RXD0 | A | SDA_CH1 | A | INV_ACTIVE | A | SDA_CH0 | A | GND | A | | C |
| 5 | SCL_CH1 | A | SCL_CH0 | A | RI | A | GND | A | SDA_CH3 | A | GND | C |
| 6 | S1_TX+ | A | S1_TX- | A | GND | B | S2_TX+ | A | S2_TX- | A | | C |
| 7 | S1_RX+ | A | S1_RX- | A | GND | B | S2_RX+ | A | S2_RX- | A | GND | C |
| 8 | SDA_CH4 | A | SCL_CH4 | A | SCL_CH3 | A | SCL_CH2 | A | I2C_PWR_B | A | | C |
| 9 | IPMB_SCL_B15 | A | IPMB_SDA_B15 | A | IPMB_SCL_A15 | A | IPMB_SDA_A15 | A | SDA_CH2 | A | GND | C |
| 10 | IPMB_SDA_B16 | A | IPMB_SCL_B16 | A | IPMB_SDA_A16 | A | IPMB_SCL_A16 | A | I2C_PWR_A | A | | |
| 11 | IPMB_SDA_A3 | A | IPMB_SDA_B3 | A | IPMB_SCL_B3 | A | IPMB_SDA_B8 | A | IPMB_SCL_B8 | A | GND | |
| 12 | IPMB_SCL_A3 | A | IPMB_SDA_A5 | A | IPMB_SCL_A5 | A | IPMB_SDA_A8 | A | IPMB_SCL_A8 | A | | |
| 13 | IPMB_SDA_A1 | A | IPMB_SDA_B7 | A | IPMB_SCL_A1 | A | IPMB_SDA_A10 | A | IPMB_SCL_A10 | A | GND | |
| 14 | IPMB_SCL_B7 | A | IPMB_SDA_A7 | A | IPMB_SCL_A7 | A | IPMB_SDA_A6 | A | IPMB_SCL_A6 | A | | C |
| 15 | IPMB_SDA_A9 | A | IPMB_SDA_B14 | A | IPMB_SCL_B14 | A | IPMB_SDA_B10 | A | IPMB_SCL_B10 | A | GND | C |
| 16 | IPMB_SCL_A9 | A | IPMB_SDA_A4 | A | IPMB_SCL_A4 | A | IPMB_SDA_B6 | A | IPMB_SCL_B6 | A | | C |
| 17 | CROSS_SDA_B | A | IPMB_SDA_B11 | A | IPMB_SCL_B11 | A | IPMB_SDA_B4 | A | IPMB_SCL_B4 | A | GND | C |
| 18 | CROSS_SCL_B | A | IPMB_SDA_A11 | A | IPMB_SCL_A11 | A | IPMB_SDA_A14 | A | IPMB_SCL_A14 | A | | C |
| 19 | IPMB_SDA_A13 | A | IPMB_SCL_A13 | A | IPMB_SCL_B12 | A | IPMB_SDA_B12 | A | IPMB_SDA_B9 | A | GND | C |
| 20 | IPMB_SDA_B1 | A | IPMB_SCL_B1 | A | CROSS_SCL_A | A | CROSS_SDA_A | A | IPMB_SCL_B9 | A | | C |
| 21 | IPMB_SDA_B13 | A | IPMB_SDA_B5 | A | IPMB_SCL_B5 | A | IPMB_SDA_B2 | A | IPMB_SCL_B2 | A | GND | C |
| 22 | IPMB_SCL_B13 | A | IPMB_SDA_A12 | A | IPMB_SCL_A12 | A | IPMB_SDA_A2 | A | IPMB_SCL_A2 | A | | C |

**Table 11: Backplane Signal Connector (J2) pin assignment (Bused IPMB)**

| | a | PS | b | PS | c | PS | d | PS | e | PS | f | PS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FAN_PRES0 | A | TXD0 | A | TXD1 | A | FAN_PRES2 | A | INT# | A | GND | C |
| 2 | FAN_PRES1 | A | DTR | A | Pres_GND | A | CI | A | DSR | A | | C |
| 3 | CD | A | RTS | A | RXD1 | A | HA[0] | A | CTS | A | GND | C |
| 4 | RXD0 | A | SDA_CH1 | A | INV_ACTIVE | A | SDA_CH0 | A | GND | A | | C |
| 5 | SCL_CH1 | A | SCL_CH0 | A | RI | A | GND | A | SDA_CH3 | A | GND | C |
| 6 | S1_TX+ | A | S1_TX- | A | GND | B | S2_TX+ | A | S2_TX- | A | | C |
| 7 | S1_RX+ | A | S1_RX- | A | GND | B | S2_RX+ | A | S2_RX- | A | GND | C |
| 8 | SDA_CH4 | A | SCL_CH4 | A | SCL_CH3 | A | SCL_CH2 | A | I2C_PWR_B | A | | C |
| 9 | | A | | A | | A | | A | SDA_CH2 | A | GND | C |
| 10 | | A | | A | | A | | A | I2C_PWR_A | A | | |
| 11 | | A | | A | | A | | A | | A | GND | |
| 12 | | A | | A | | A | | A | | A | | |
| 13 | | A | | A | | A | | A | | A | GND | |
| 14 | | A | | A | | A | | A | | A | | C |
| 15 | | A | IPMB_SDA_B | A | IPMB_SCL_B | A | | A | | A | GND | C |
| 16 | | A | | A | | A | | A | | A | | C |
| 17 | CROSS_SDA_B | A | | A | | A | | A | | A | GND | C |
| 18 | CROSS_SCL_B | A | | A | | A | IPMB_SDA_A | A | IPMB_SCL_A | A | | C |
| 19 | | A | | A | | A | I | A | | A | GND | C |
| 20 | | A | | A | CROSS_SCL_A | A | CROSS_SDA_A | A | | A | | C |
| 21 | | A | | A | | A | | A | | A | GND | C |
| 22 | | A | | A | | A | | A | | A | | C |

**Table 12: Backplane connector (J1) and (J2) pin description**

| | |
|---|---|
| -48V_A | -48 VDC supply A |
| -48V_B | -48 VDC supply B |
| AIR_FILT_PR | Air filter presence (grounded by air filter presence switch to detect a missing air filter) |
| CD | Serial Interface 1 Carrier Detect |
| CI | Chassis Intrusion signal of ADM1026 |
| CROSS_SCL_A | Serial Clock of IPMB-A, cross-connected on Backplane to serial clock of IPMB-B of other Shelf Manager |
| CROSS_SCL_B | Serial Clock of IPMB-B, cross-connected on Backplane to serial clock of IPMB-A of other Shelf Manager |
| CROSS_SDA_A | Serial Data of IPMB-A, cross-connected on Backplane to serial data of IPMB-B of other Shelf Manager |
| CROSS_SDA_B | Serial Data of IPMB-B, cross-connected on Backplane to serial data of IPMB-A of other Shelf Manager |
| CTS | Serial Interface 1 Clear To Send |
| DSR | Serial Interface 1 Data Set Ready |
| DTR | Serial Interface 1 Data Terminal Ready |
| FAN_24V | Auxiliary 24 VDC (max. 100 mA) generated on Fan Trays (Voltage supply for opto-couplers on Shelf Manager) |
| FAN_24V_RTN | Return path (Ground reference) for the auxiliary 24 VDC, generated on Fan Trays, used also as reference ground for the fan control voltage |
| FAN_PRES[0...2] | Fan Tray present (grounded on Fan Tray when present) |
| FAN_SPEED | DC for Fan Speed Control (0 V to 10 V, 10 mA) |
| FAN_TACH[0...8] | Tachometer signals from Fan Trays |
| GND | logic ground |
| HA[0] | Hardware address of Shelf Manager<br>- grounded: Shelf Manager IPMI address is 0x10<br>- open: Shelf Manager IPMI address is 0x12 |
| HA7 | Hardware address of Shelf Manager<br>- grounded: Shelf Manager IPMI address is 0x10<br>- open: Shelf Manager IPMI address is 0x12 |
| HLY_Input# | Health input Shelf Manager (proprietary signal cross-connected on Backplane to HLY_Output of other Shelf Manager) |
| HLY_Output# | Health output Shelf Manager (proprietary signal cross-connected on Back-plane to HLY_Input of other Shelf Manager) |
| HS_EN | Tells the Shelf Manager that it is plugged in (Grounded on Backplane) |
| I2C_PWR_A | 3.6 V (max. 500 mA) generated on Shelf Manager, redundant path A for Shelf $I^2C$-devices on Fan Trays, PEMs and SAP |
| I2C_PWR_B | 3.6 V (max. 500 mA) generated on Shelf Manager, redundant path B for Shelf $I^2C$-devices on Fan Trays, PEMs and SAP |
| INT# | External Interrupt request (Master Only $I^2C$-bus) |
| INV_ACTIVE | This ShMM is in active mode (inverted signal of ShMM) |
| IPMB_SCL_A_[1...16] | Serial Clock, IPMB-A |
| IPMB_SCL_B_[1...16] | Serial Clock, IPMB-B |
| IPMB_SDA_A_[1...16] | Serial Data, IPMB-A |
| IPMB_SDA_B_[1...16] | Serial Data, IPMB-B |

| | |
|---|---|
| NC | not connected |
| PEM_PRES_[A, B] | PEM [A, B] presence signal (grounded on PEM when present) |
| PRES_1# | Shelf Manager board presence signal (proprietary signal cross-connected on Backplane to PRES_GND of other Shelf Manager) |
| PRES_GND# | Shelf Manager presence ground (proprietary signal cross-connected on Backplane to PRES_1# of other Shelf Manager) |
| PWM_C | Opto isolated PWM signal for fan speed control, collector<br>$U_{CE0}$ = max. 70 V, $I_{max}$ = 2 mA |
| PWM_E | Opto isolated PWM signal for fan speed control, emitter, connected to FAN_24V_RTN on Backplane |
| RI | Serial Interface 1 Ring Indication |
| RTS | Serial Interface 1 Request To Send |
| RX(+-) | Ethernet interface (ETH1) to Hub-Slot (ShMC cross connect) |
| RXD0 | Serial Interface 1 Receive Data |
| RXD1 | Serial Interface 2 Receive Data (not used in Schroff Shelves) |
| S1_RX(+-) | Ethernet interface (ETH0) |
| S1_TX(+-) | Ethernet interface (ETH0) |
| S2_RX(+-) | USB interface, cross-connected on Backplane to S2_TX(+-) of other Shelf Manager |
| S2_TX(+-) | USB interface, cross-connected on Backplane to S2_RX(+-) of other Shelf Manager |
| SAP_PRES | Presence signal of SAP (Grounded on SAP when present) |
| SCL_CH0 | Master Only-$I^2C$-bus Channel 0 to SAP |
| SCL_CH1 | Master-Only $I^2C$-bus Channel 1 |
| SCL_CH2 | Master-Only $I^2C$-bus Channel 2 |
| SCL_CH3 | Master-Only $I^2C$-bus Channel 3 |
| SCL_CH4 | Master-Only $I^2C$-bus Channel 4 |
| SDA_CH0 | Master Only-$I^2C$-bus Channel 0 to SAP |
| SDA_CH1 | Master-Only $I^2C$-bus Channel 1 |
| SDA_CH2 | Master-Only $I^2C$-bus Channel 2 |
| SDA_CH3 | Master-Only $I^2C$-bus Channel 3 |
| SDA_CH4 | Master-Only $I^2C$-bus Channel 4 |
| SHELF_GND | Shelf Ground |
| SWR_Input# | Switchover signal from the other Shelf Manager (proprietary signal cross-connected on Backplane to SWR_Output of other Shelf Manager) |
| SWR_Output# | Switchover signal to the other Shelf Manager (proprietary signal cross-connected on Backplane to SWR_Input of other Shelf Manager) |
| TX(+-) | Ethernet interface (ETH1) |
| TXD0 | Serial interface 1 Transmit Data |
| TXD1 | Serial interface 2 Transmit Data (not used in Schroff Shelves) |
| VRTN_A | Voltage return supply A |
| VRTN_B | Voltage return supply B |

# 18 Technical Data

**Table 13: Technical Data**

| | |
|---|---|
| **Physical Dimensions** | |
| Height | 2 U (Frontplate 10 mm) |
| Width | 20 mm with EMC gaskets |
| Depth (PCB) | 280 mm |
| Depth (with connectors and handle) | 310 mm |
| **Weight** | |
| Shipping weight completely assembled without packaging | 0.6 kg |
| **Power** | |
| Input voltage | -40.5 VDC …. -72 VDC |
| Power dissipation | max. 10 W |
| Overcurrent Protection | 500 mA Fuses on PCB |
| **Environmental** | |
| Ambient temperature | -5°C…+55°C |
| Humidity | +5%...+85%, no condensation |

**SCHROFF GMBH**

**Langenalberstr. 96-100**
**D-75334 Straubenhardt**

**www.schroff.biz**
**www.a-tca.com**
**Tel.: + 49 (0) 7082 794-0**

**Fax: +49 (0) 7082 794-200**